

## Cache/Disk System



The SPERRY UNIVAC® Cache/Disk System (C/DS) is an I/O hierarchical mass storage system incorporating a technology and architectural concept that provides a system offering significant I/O performance advantages for the SPERRY UNIVAC 1100/80 and 1100/60 Systems. The use of semiconductor storage in conjunction with large capacity fixed disk storage will permit frequently used data to be automatically stored in solid state memory to provide "data acceleration" via the improved access time.

The Cache/Disk System consists of one or two 5057 Cache/Disk Processors, up to four 7053 Storage Units and up to sixteen 8450 or 8470 Disk Units.

The 7053 Storage Unit Capacity is 4M Bytes of MOSFET RAM

Memory that can be utilized as a Cache Memory or a word-addressable Solid State Disk (SSD). Access time is 0.8 microseconds as an SSD.

The Cache/Disk System functions as an on-line peripheral subsystem attached to a 36-bit word channel of a Series 1100/80 or 1100/60 processor.

While the performance advantage of Cache/Disk will be application dependent, simulation studies to date show a significant improvement over older disk and drum subsystems. This performance increase is for the Mean Service Time (elapsed time from requesting a record on mass storage to the time the CPU receives it).

Mean Service Time at a 75% "hit" rate can be in the range of 15-20 MS or at least 2-3 times better

than contemporary disk subsystems.

The Cache/Disk System will provide a more constant high level of performance than can be attained for mixed disk and FH drum (or FH disk) subsystems without the constant monitoring and rearrangement of files between the drum and disk subsystem.

Cache/Disk also allows for much higher disk surface utilization by using record sizes of 1792 words (8,064 bytes) which would normally reduce performance of non-cache disk subsystems. This results in maximum use of disk storage space with fewer disk drives required to satisfy data base requirements using 8470 Disk Storage.

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The Cache/Disk System can be configured in several modes of operation: Cache/Disk, Solid State Disk (SSD), or a combination of both.

When used in a Cache/Disk mode, data is automatically moved in data segments of 448 words or 1792 words from 8450 or 8470 disks to 7053 cache storage. If data requested is in cache, it may be transferred to the host with an average access time of approximately 1 MS. If data is not in cache, a slight performance degradation over normal disk operation is encountered while the data segment is rolled into cache. Subsequent requests should result in a hit and overall improvement in I/O performance.

Cache/Disk may also be used to operate with a portion, or all of the 7053 storage used as a "Solid State Disk". The capacity of 4 MB (917,504 words) is equivalent to 3.5 FH 432's. The access time is 0.8 $\mu$  SEC versus 4.25 MS for the FH 432. Some users may find this mode of operation best suited for optimizing access to designated data in real time applications.

A combination of both Cache/Disk and SSD can also be configured to satisfy both real-time and batch performance requirements.

The overall benefits of the Cache/Disk System include faster I/O response time—less CPU wait; more capacity per disk—optimum surface utilization; flexibility—Cache/Disk or SSD; cost/performance effectiveness and it complements 1100 OS software design.



## FUNCTIONAL DESCRIPTIONS

### 5057 Cache/Disk Processor

The 5057 is a microprogrammed processor which controls all data access from the Cache/Disk System, i.e.: Indexing, searching, buffering, storage management, staging and destaging algorithms, and error recovery. These design features utilize expandable Cache Memory for dramatic reductions in the frequency of disk accesses. Multiple data buffers in the 5057 insure full utilization of the simultaneous data transfer rates from both the 8450/8470 and the 7053 Cache Memory.

7053 Cache Memory is user transparent. The host addresses data as if it were on disk drives and the controller satisfies the request from cache storage with possibly no disk operation. A separate 7053 indexing feature, called the Segment Descriptor Table (SDT), is required in one of the 7053 units when the unit is used as Cache Memory.

The SDT contains an ever changing list of disk addresses. These entries point to Cache Storage areas which contain duplicates of data in recently referenced disk space. When an index find occurs, data transmission between cache and host begins in about 1 MS. If an index miss occurs, the 5057 Processor will issue a seek to disk and disconnect for other activity. Data is subsequently staged into cache as well as to the host. If the cache copy of a data segment is updated, a "written to flag" for the index is

set. This indicates that the data request is to be destaged to disk storage.

Solid State Disk (SSD) is the second mode of operation for the 7053 and is directly addressed by the host. In conjunction with a subset of commands, the data location is specified as a word address relative to the beginning of a 4 MB 'device'. Access time is approximately 0.8 $\mu$  SEC.

## COLORS

### Standard Colors

Frame.....	Slate Gray
Front/Rear.....	Persimmon Red or Ceramic Blue
Top.....	Pale Gray
End Panels.....	Charcoal Brown

## PHYSICAL DESCRIPTION

Width: 56 in. (141 cm)  
Height: 65 in. (163 cm)  
Depth: 32 in. (80 cm)  
Weight: 750 lb. (340 kg)

## POWER REQUIREMENTS

**Frequencies:** 60 Hz or 50 Hz

**Nominal Load:** 2.0 KVA

**Nominal Voltages**

200/208/230/240 VAC + 6%	—15% @ 60 Hz ± 2%
200/220/230/240 VAC + 6%	—15% @ 50 Hz ± 2% DELTA
380/400/416 VAC + 6%	—15% @ 50 Hz ± 2% WYE

**Maximum Load:** 2.2 KVA

## ENVIRONMENTAL REQUIREMENTS:

### Shipping & Storage

Temperature: —40°F. (—40°C.) to 144°F. (62°C.)  
Humidity: 1% to 95%

### Working Range

Temperature: 50°F. (10°C.) to 93°F. (34°C.) with max. rate of change 20°F./hr. (11°C./hr.).

Humidity: 20% to 85% (with no condensation)

### Heat Dissipation

6140 BTU Nominal  
6480 BTU Maximum



### 7053 Storage Unit

The 7053 consists of a free-standing cabinet containing 4 Megabytes of 16K RAM MOSFET Memory. The 7053 can be configured at SYSGEN Time as cache memory or Solid State Disk (SSD).

The 7053 allows simultaneous transfers from Cache memory and the SDT via two 5057 processors in a dual access, dual processor configuration. Transfers from the Cache (or SDT) to the 5057 is at a rate of 5M Bytes/Second.

Stand-by SDT's in other cabinets can be used to provide redundancy in case of failure of the primary SDT. Duplicate copy of SDT entries is maintained in the cache data segment. This provides the means to clear cache using the duplicate SDT copy and then reinitialize the cache using the stand-by SDT feature.

The 7053 contains error correction logic capable of single bit error correction and double bit error detection on both the Cache and SDT.

An uninterruptable power supply that will provide backup power to the 7053 during a main power interruption of up to fifteen minutes is provided. If longer protection is desired a site UPS is recommended.

### COLORS

#### Standard Colors

Frame.....Slate Gray  
Front/Rear....Persimmon Red or Ceramic Blue  
Top.....Pale Gray  
End Panels....Charcoal Brown

(This is a color repertoire; Definition of these colors is given in Color Selection Brochure U5329, which your Sperry Univac representative has available.)

### PHYSICAL DESCRIPTION

Width: 36 in. ( 92 cm)  
Height: 64 in. (163 cm)  
Depth: 30 in. ( 77 cm)  
Weight: 788 lb. (358 kg)

### POWER REQUIREMENTS

**Frequencies:** 60 Hz or 50 Hz

**Nominal Load:** 2 KVA

#### Nominal Voltages

200/208/230/240 VAC + 6%  
—15% @ 60 Hz ± 2%  
200/220/230/240 VAC + 6%  
—15% @ 50 Hz ± 2 % DELTA  
380/400/416 VAC + 6%  
—15% @ 50 Hz ± 2 % WYE

**Maximum Load:** 4 KVA

### ENVIRONMENTAL REQUIREMENTS

#### Shipping & Storage

Temperature: —40°F. (—40°C.) to 144°F. (62°C)  
Humidity: 1% to 95%

#### Working Range

Temperature: 50°F. (10°C.) to 93°F. (34°C.) with max. rate of change 20°F./hr. (11°C./hr.)

Humidity: 20% to 85% (with no condensation)

Heat Dissipation: 10K BTU

### FUNCTIONAL CHARACTERISTICS

#### Data Capacity

1792 words per segment,  
917,504 words per unit,  
3,670,016 words per cache/disk system.

### Transfer Rate

5 MB per second  
Access Time (SSD) —0.8 $\mu$  SEC constant.  
Segment Descriptor Table (SDT) —16,384 words.  
512 Segments per unit

### 8450 Disk Drive

The 8450 disk drive contains a fixed head disk assembly consisting of 8 platters providing 15 recording surfaces. The sixteenth surface is used for servo positioning information and fixed head area. Each disk drive stores up to 307 million bytes or 67 million words using 448 word format.

### 8470 Disk Drive

The SPERRY UNIVAC 8470 Disk offers over two billion words (36 bits) of storage. Each 8470 disk drive has 125,440,000 words of moving head storage and a fixed head storage option of 338,688 words, when using the 448 word prep factor. Used in connection with the Cache/Disk System, the 8470 is prepped at 1792 words/sector and has a capacity of 143,360,000 words of moving head storage. The capacity of 16 drives is equal to 2.29 B words of storage.

The 8470 Disk Drive contains a disk assembly consisting of nine platters with sixteen recording surfaces. An additional surface is used for servo information and a fixed head data area, if the fixed head option is present.

Working with 8450 Disk Drives and the 8470 Disk, the Cache/Disk System offers flexibility, performance and modular growth necessary in today's direct access subsystems.



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